

# Balloon Skewer



## Materials

- Rubber balloons
- Bamboo skewer
- Dish soap or vegetable oil

## Protocol

1. Blow up your balloon until it is about  $\frac{2}{3}$  full of air and tie it.
2. Look at your balloon. You should see two thicker spots of rubber on the bottom (at the knot) and at the top of the balloon.
3. Coat your bamboo skewer with a few drops of dish soap or vegetable oil.
4. Place the sharp tip of your skewer at the thick spot on the bottom of your balloon and gently push the skewer into the balloon.
5. Push the skewer through the balloon until the tip reaches the thick spot on the top of the balloon.
6. Keep pushing until the skewer pokes through the top of the balloon.
7. You now have a balloon on a skewer!
8. If you remove the skewer, the balloon will begin to deflate, but will not pop.

## How does it work?

The skewer does not pop the balloon thanks to long chains of molecules called **polymers**. In this experiment, our polymers are composed of rubber molecules. These polymers have a property called **elasticity** that allows them to stretch when you blow up the balloon. The more a polymer is stretched, the more **stress** it is under. The thicker spots at the top and the bottom of the balloon are areas where the polymers are the least stretched, and therefore are under the least amount of stress. This allows us to pierce the balloon in these spots without popping it because the polymers will just stretch around the skewer. If you tried to put the skewer into the middle of the balloon, the balloon would pop because the polymers in this area are under a lot of stress. Because these polymers are under so much stress, a puncture from the skewer would cause these polymers to tear instead of stretch, making the balloon pop!